

Notice of Allowability

Application No.

10/825,024

Applicant(s)

KEITER ET AL.

Examiner

John Pettiitt

Art Unit

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 3/22/2007.
2. ☒ The allowed claim(s) is/are 4-9.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Frank Foster on June 4, 2007. The application has been amended as follows:

The recitation, "and is nearer the output cooling power at the selected minimum piston stroke than it is to the cooling power at a maximum permissible piston stroke" within claim 1 (lines 17-18) is amended as follows:

-- and is nearer the output cooling power at the selected minimum piston stroke than *the output cooling power demand* is to the cooling power at a maximum permissible piston stroke --.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

In regard to claim 4, the prior art of record fails to teach or reasonably suggest a method of cooling by a free piston cryocooler wherein the cryocooler is designed for operation such that the cooling power demanded by the cryocooler is nearer to the cooling power provided at the selected minimum piston stroke than at a maximum permissible piston stroke. Generally, cryocoolers are designed to operate nearer the greatest cooling power (largest piston stroke) available in order to receive the most

cooling available from the cryocooler as possible. To design and operate a cryocooler nearer a minimum cooling power limit of the cryocooler would be opposite of conventional practice and design.

In regard to claim 5, the prior art of record fails to teach or reasonably suggest applying heater power as an increasing difference between the current piston drive signal (which represents the present difference between the set point temperature and detected temperature) and the piston drive signal for minimum piston stroke.

In regard to claim 7, the prior art teaches a piston stroke modulator capable of modulating the stroke of the prime mover, a heating apparatus, and a heater control element. But the prior art of record fails to teach or reasonably suggest a heater controller having an input connected to receive the piston drive signal for modulating the heater power as an increasing function of the difference between the desired piston stroke and the minimum piston stroke.

In regard to claim 8, the prior art of record fails to teach or reasonably suggest a second control element to which a second actuating signal is applied for controlling the heater power of the heater, wherein the second actuating signal is the same or is derived from the first actuating signal and the heater power is increased as a function of decreasing second actuating signal value.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Pettitt whose telephone number is 571-272-0771. The examiner can normally be reached on M-F 8a-4p.

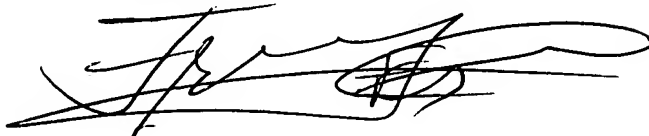
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John Pettitt/
Examiner
Art Unit 3744

JFP III
June 4, 2007

FRANTZ JULES
SUPERVISORY PATENT EXAMINER

A handwritten signature in dark ink, appearing to read 'Frantz Jules', is written over the printed name and title of the Supervisory Patent Examiner.